

## V-ZED

Last Issue we explained how to obtain three new functions from the VZ200, including a POKE which turns off the beeping keyboard. Reader Ken Hicks became concerned that this latter recommendation might actually cause some damage to the innards of the computer and possibly to the speaker itself, he writes:

I read with some interest your piece on the new functions for the V-ZED.

It was on the strength of your supporting this machine that I bought one for my young son. To date I have had no joy with the darn thing — it has twice been returned for service, and I have not yet received it or a replacement.

I purchased a copy of the Technical Reference Manual with the unit, so while waiting for the unit to turn up again, I have read the manual from cover to cover, which probably is not a bad idea, but which I almost certainly would not have done under normal circumstances. This Manual gives full circuit diagrams and reveals the very much simplified address decoding. There is also some very useful information on the System pointers, memory mapping, and particularly the details of graphics.

The addresses of a few routines in ROM are given, which will be familiar to ML programmers who use the old Microsoft ROM. For example, 28A7H and 01C9H are still message output and clear screen routines.

Evidently the writer of your article has not studied his TR Manual, as it gives details of the function of an output latch which effectively occupies all locations from 6800 to 6FFF inclusive. This is a write-only latch which services the cassette output, speaker, and video display controller. This latch is copied at 783B (30779), and its bit allocation is:

Bits 0 & 5 drive the speaker. They are normally toggled alternatively in a push-pull fashion to produce a tone. Holding one bit at '0' would therefore hold the speaker diaphragm 'pushed', while holding the other bit at '0' would keep it 'pulled', with an audible click as it went from one state to the other.

Bits 1 & 2 generate the cassette output signal. Fiddling with these could corrupt a tape if the cassette were in the RECORD position!

Bit 3 controls the VDC display mode. An '0' here sets MODE (0), while a '1' causes the VDC to operate in MODE (1). This effect is via the video controller chip.

Bit 4 controls the background colour. If it is '0' then the background will be green, while if it is '1' the background will be orange if in MODE (0) and buff if in MODE (1).

Thus, its effect depends on bit 3.

The BEEP routine is at 3450H. Calling this address will produce a

BEEP, but some disassembly around this area would be necessary (or perhaps around the keyboard scanning area — from 2EF4H) to find out how to silence the BEEP. It is possible that the brute force method suggested by your correspondent could damage the speaker or a chip by passing a current continuously, which is apparently what happens when '0' is POKED into 30779. I don't want to disparage your correspondent, but this just could be one instance where it is possible to cause physical damage to a computer via the keyboard!

Thank you Ken. There are two minor errors in your analysis of the situation of which one is significant to this discussion. Firstly, to correct a point of fact, bit 5 of the output latch is always held high whilst bit 0 is toggled from high to low to produce sound from the speaker. Of far more significance than that, however, is the nature of the "Speaker" itself. It is a piezo electric device. i.e. it consists of a crystalline substance with two metallised plates, one connected to bit 5 the other to bit 0. When there is a voltage difference between these two plates, the crystal actually changes shape, thus displacing the air surrounding it causing a "Click" to be heard (if the differential voltage has been applied rapidly enough). The BEEP routine you mention at 3450H alternatively sets and resets bit 0 thus applying a continually varying voltage across the crystal causing it to change shape rapidly and emit an audible tone. During this process very little energy is dissipated since the piezo electric device appears electrically like a capacitor being alternatively charged and discharged. This device will not be damaged by applying a constant potential across it which is within its operating range. Nor will any IC be called on to carry excessive currents. In short, the POKE's recommended will not cause any harm to the computer. Nevertheless, thank you for raising this interesting subject. We would welcome similar contributions from our other readers.

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